

# **California Water Plan Update 2013**

## **California Water Sustainability Indicators**

**Workshop  
August 24, 2011**

# Water Plan Update 2013

## CA Water Sustainability Indicators

### Project Overview

# Why Are We Doing This?

## A Recurring Question:

"How can we ascertain that the resource management strategies and objectives of the CA Water Plan are providing sustainable water uses and reliable supplies for the State and its various hydrologic regions?"

# Why Are We Doing This?

In Water Plan Update 2009, one of the guiding principles established for decision-making:

“Determine values for economic, environmental, and social benefits, costs, and tradeoffs to base investment decisions on sustainability indicators.”

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## CA Water Sustainability Indicators

### Objective

Help monitor progress to meeting water sustainability objectives through the development and application of an analysis framework.

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## CA Water Sustainability Indicators

### Challenges

- ❑ No consistent terminologies & definitions
- ❑ No systematic analytic framework or methods for quantifying indicators
- ❑ Limited data

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## CA Water Sustainability Indicators - Work Plan

### ❑ Develop Analytical Framework

- Develop water sustainability objectives.
- Identify indicators and targets or desired future conditions.
- Describe analytical and interpretation methods.

### ❑ Conduct Quantitative Analysis

- Conduct detailed Pilot for a relatively small area.
- Conduct high level Pilot for the hydrologic regions, rolled up to the entire State.

### ❑ Perform Gap Analysis

- Identify issues.
- Identify data gaps.

**Weblink:** <http://www.waterplan.water.ca.gov/materials/index.cfm?subject=aug24b11>

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## CA Water Sustainability Indicators

### Where Are We Now in Framework Building?

- ❑ 2010: Project charter developed.
  - California Water Plan's work team.
- ❑ 2010/2011: Project charter revised with feedback from
  - State Agency Steering Committee
  - Water Plan Public AC
  - Water Plan Tribal AC
  - Delta Stewardship Council
  - Strategic Growth Council
  - Sustainable Water Resources Roundtable



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## CA Water Sustainability Indicators

### Where Are We Now in Framework Building?

#### □ 2011:

- UC Davis starts providing technical assistance in the project.
- USEPA Region 9 starts collaboration with DWR.

#### □ July 21, 2011:

- Draft Framework reviewed by Workgroup.

#### □ August 5, 2011:

- Draft Framework presented to Tribal AC.

#### □ August 24, 2011 (today's Workshop):

- Draft Framework presented to an array of stakeholders.

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## CA Water Sustainability Indicators

### Relevance to IRWM Planning

- ❑ Provides a toolbox for IRWM regions to conduct water sustainability analysis at the local scale using local data, results from which may be rolled up to regional and state level.
- ❑ Agencies may improve their water sustainability through an evaluation of condition and trends of suitable indicators.
- ❑ The analysis may help identify issues and data gaps to inform future data monitoring needs.
- ❑ The analysis may highlight policy needs to ensure local and regional water sustainability.


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## CA Water Sustainability Indicators

### □ Workshop Goals:

- Review Draft California Water Sustainability Indicators Framework.
- Seek feedback, input, and guidance on the Draft Framework .

### □ Components of Framework presented today:

- Definition of water sustainability.
  - The Framework flowchart.
  - Water sustainability objectives.
  - Example indicators.
- 

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## CA Water Sustainability Indicators

### □ Workshop participants' anticipated role:

- Review the materials presented.
- Participate in group discussions and provide feedback.
- Brainstorm integration of environmental indicators with social & economic indicators.
- Seek to find common grounds in identifying objectives and indicators.





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## CA Water Sustainability Indicators

### Sustainability

A Dynamic of the Present  
*and*  
of the Future

# As A Dynamic

## ➤ Key Questions include:

- What is the **time** horizon of the decision?
- What is the **trajectory** set by the decision?
- What is the **scale** of the decision?
- Does it **extend** to future generations?

# Sustainability's Key Questions

- What is the **level of uncertainty**?
- What is the **level of risk**?
- Are resources consumed **renewable**?
- Are the resources consumed **substitutable**?



# Sustainability's Answers

- Sustainability's Answers Require:
  - Systems' Thinking
  - Holistic Approach
  - Awareness of Time Horizons, Scales, Trajectories
  - Less Tolerance of Risk & Uncertainty
  - New Tools
  - Discovering Common Ground for Solutions
  - Continuous Education

# Sustaining California Water Needs

## ➤ Question:

Who and What is being Sustained?

➤ Answer: The people of the State of California, the ecosystems on which their water supply, and water quality depend, as well as appropriate levels of water reliability, water infrastructure, flood protection and the associated supporting institutions.

# Sustaining California Water Needs

- Key Sustainability Question:

Is this system, on which the people of the State of California depend, sustainable?

- Key Sustainability Answer:

**It must be sustainable!**

# Proposed Definition

- *Water sustainability for California is the dynamic state of water use and supply in the state that meets today's needs without compromising the long-term capacity of the natural and human aspects of the water system to meet the needs of future generations.*

# Topics for Discussion

- What, if any, important concepts are missing from the proposed definition as it relates to water sustainability in California?



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## CA Water Sustainability Indicators

### Proposed Approach

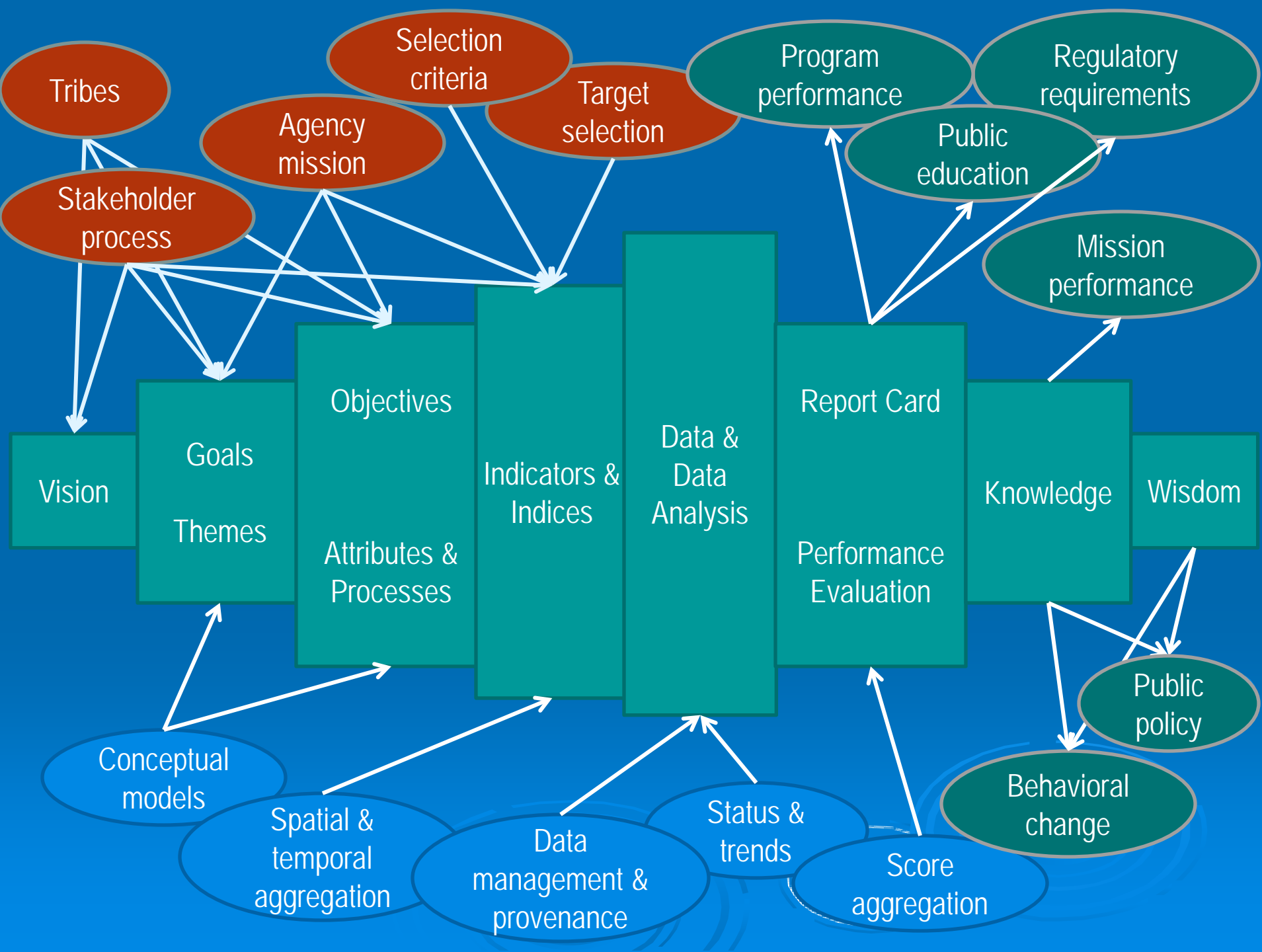
# Steps

- Step 1** Define water sustainability and related terms
- Step 2** Describe the overall vision for sustainability, goals corresponding to the vision, and measurable sustainability objectives; describe themes (e.g., water supply) and system processes
- Step 3** Select indicators corresponding to the objectives and covering all themes and processes; define targets for each indicator; describe potential causes of change in indicator condition
- Step 4** Collect data for each indicator, maintain and describe data provenance; analyze data according to distance from current state from target state and describe analytical steps; measure trend in condition and significance of trend
- Step 5** Describe summary condition and trend in condition in report card; evaluate performance of system sectors
- Step 6** Evaluate causes of condition departure from target condition and individual and programmatic actions that could maintain good conditions and repair poor conditions
- Step 7** Describe contribution of evaluation to change in knowledge, policy effectiveness, and public education



# Sustainability and others terms

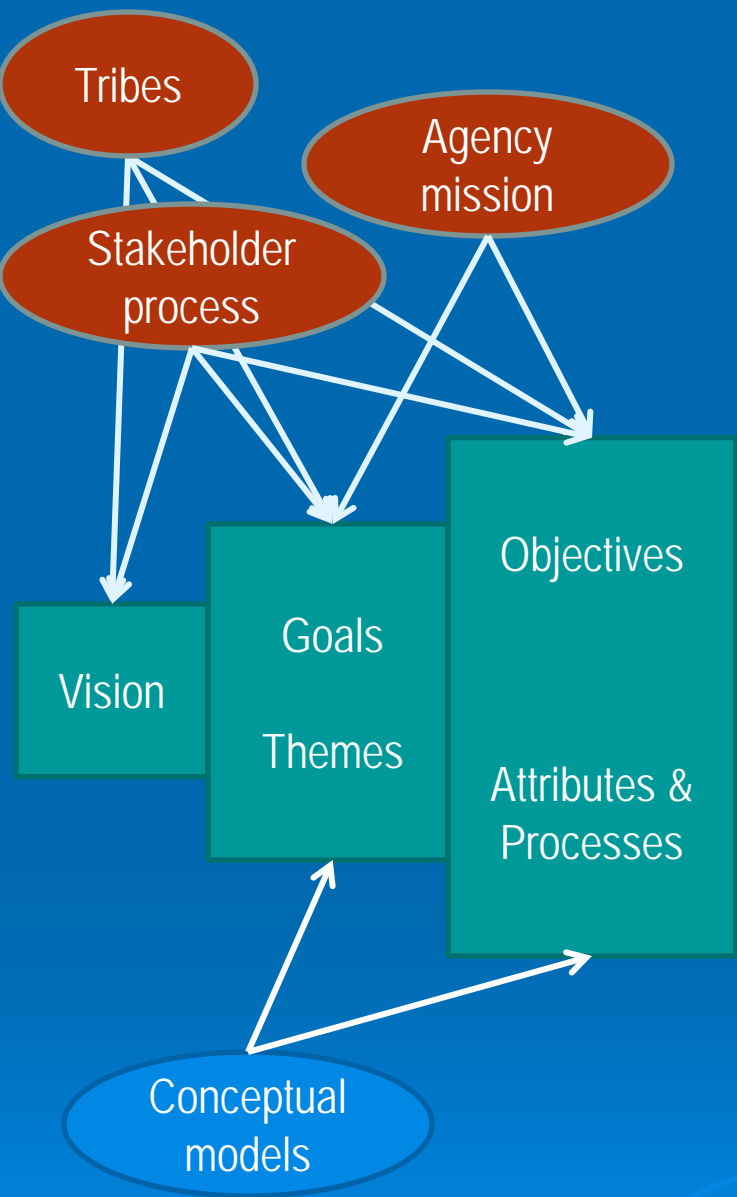
- What does sustainability mean and how do we measure it?
- Goals, objectives
- Themes, domains
- Index, indicators, metrics
- References and targets
- Report card and evaluation



# Topics for Discussion

## ➤ Sustainability Indicators Framework

- How or are you taking into account water sustainability in your policy considerations?
- How can this Framework inform the policies that you are operating under or developing?
- How does or can the Framework relate to your day-to-day management of resources under various regulatory requirements?
- What additional steps or components should we consider for the Framework?

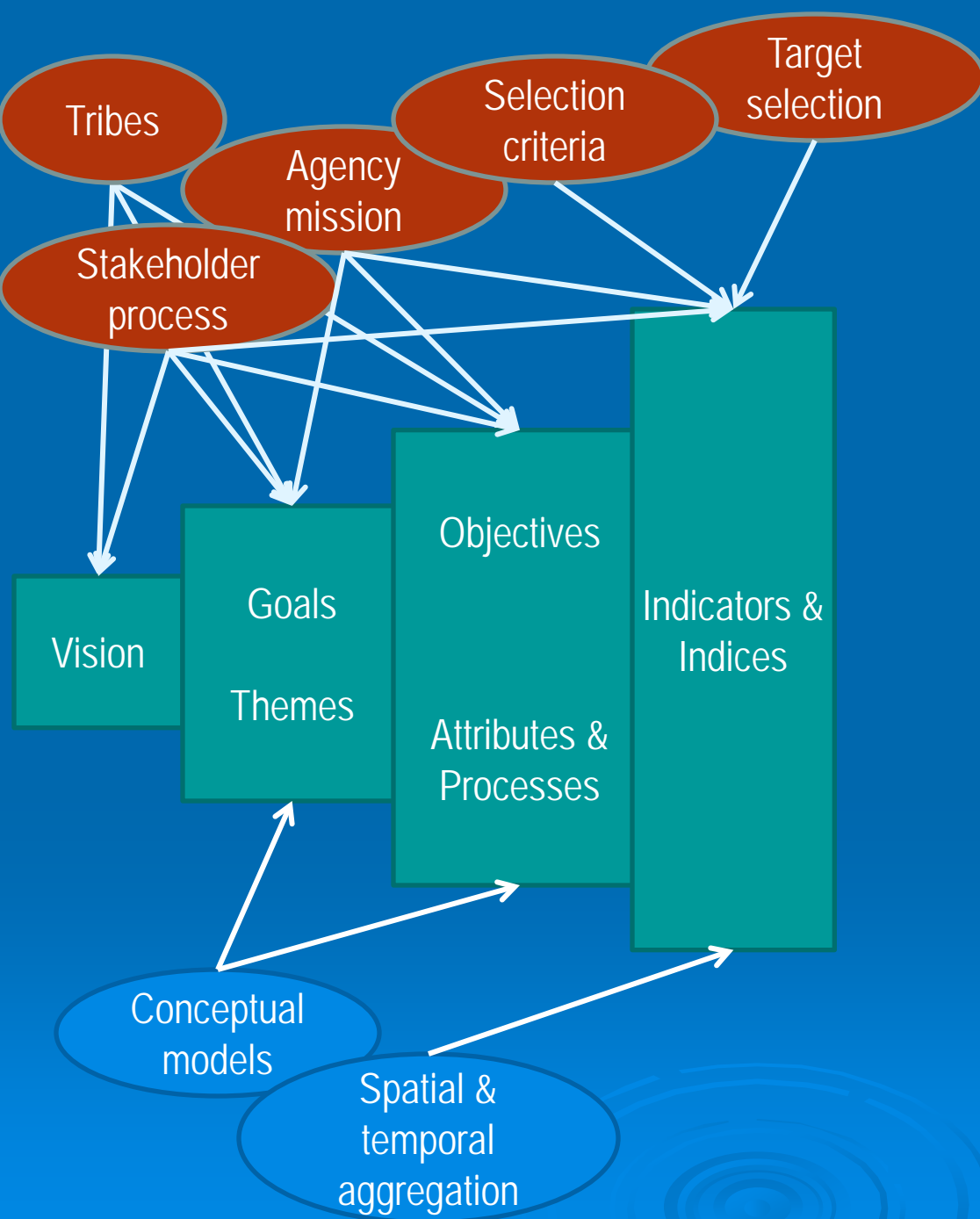


Proposed Sustainability Objectives	Relationship to Water Plan 2009
1. (Umbrella sustainability objective) Manage water in a manner that can be continued into the future without endangering future water availability or causing unacceptable environmental, social, or economic impacts.	Reflects overall goal of sustainability
2. Improve water use efficiency, increase water recycling, and increase water conservation in order to improve water supply reliability, reduce energy demand, and restore and maintain aquatic ecosystems and processes.	CWP Objective 2, 9; RMS Reduce demand
3. Improve regional water movement operations and efficiency and investigate new water technologies to contribute to social and ecological beneficial uses and reduce impacts associated with inter-basin water transfers.	CWP Objective 1, 2, 7, 11, RMS Operational efficiency
4. Increase conjunctive management of new and recycled water from multiple sources to increase quantity, quality, and reliability of drinking water, irrigation water, and in-stream flows.	CWP Objective 3, 12, 13; RMS Increase water supply
5. Protect and restore surface water and groundwater quality and the natural systems that maintain these services in order to safeguard human and environmental health and secure California water supplies.	CWP Objective 4; RMS on water quality; chapter 4 discussion of water quality sustainability indicators
6. Practice, promote, improve, and expand environmental stewardship to protect and enhance environmental conditions by improving watershed, floodplain, and aquatic condition and processes.	CWP Objective 5, 12, 13; RMS Natural Resources
7. Integrate flood risk management with other water and land management and restoration activities.	CWP Objective 1, 6, 12, 13; RMS Improve flood
8. Improve and expand monitoring, data management, and analysis to support decision-making, especially in light of uncertainties, that support integrated regional water management and flood and water resources management systems	CWP Objective 10; various RMSs; CWP Vol. 1 Chapter 6 Integrated Data and Analysis

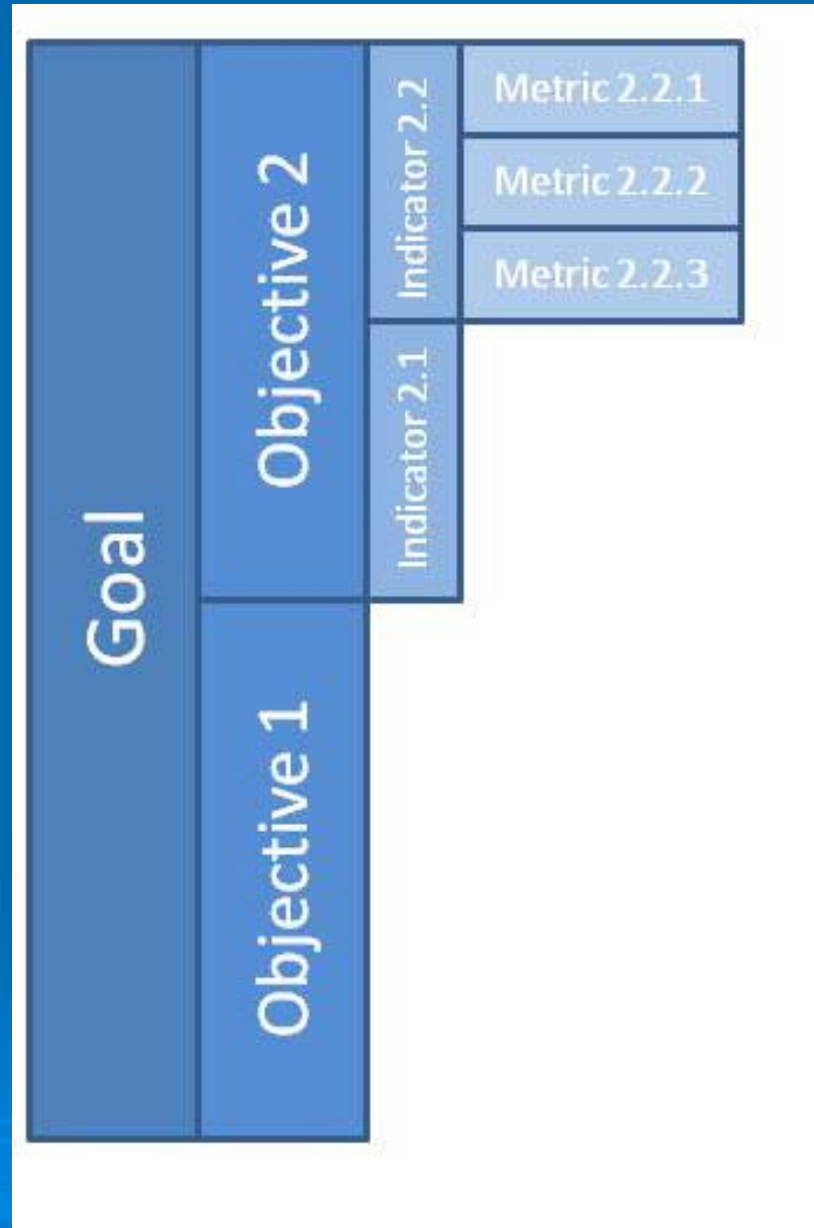
# Topics for Discussion

## ➤ Sustainability Objectives

- How should social and economic issues be more explicitly integrated into sustainability objectives?
- What can we add, subtract, or change about the current set of objectives?



# Organizing indicators





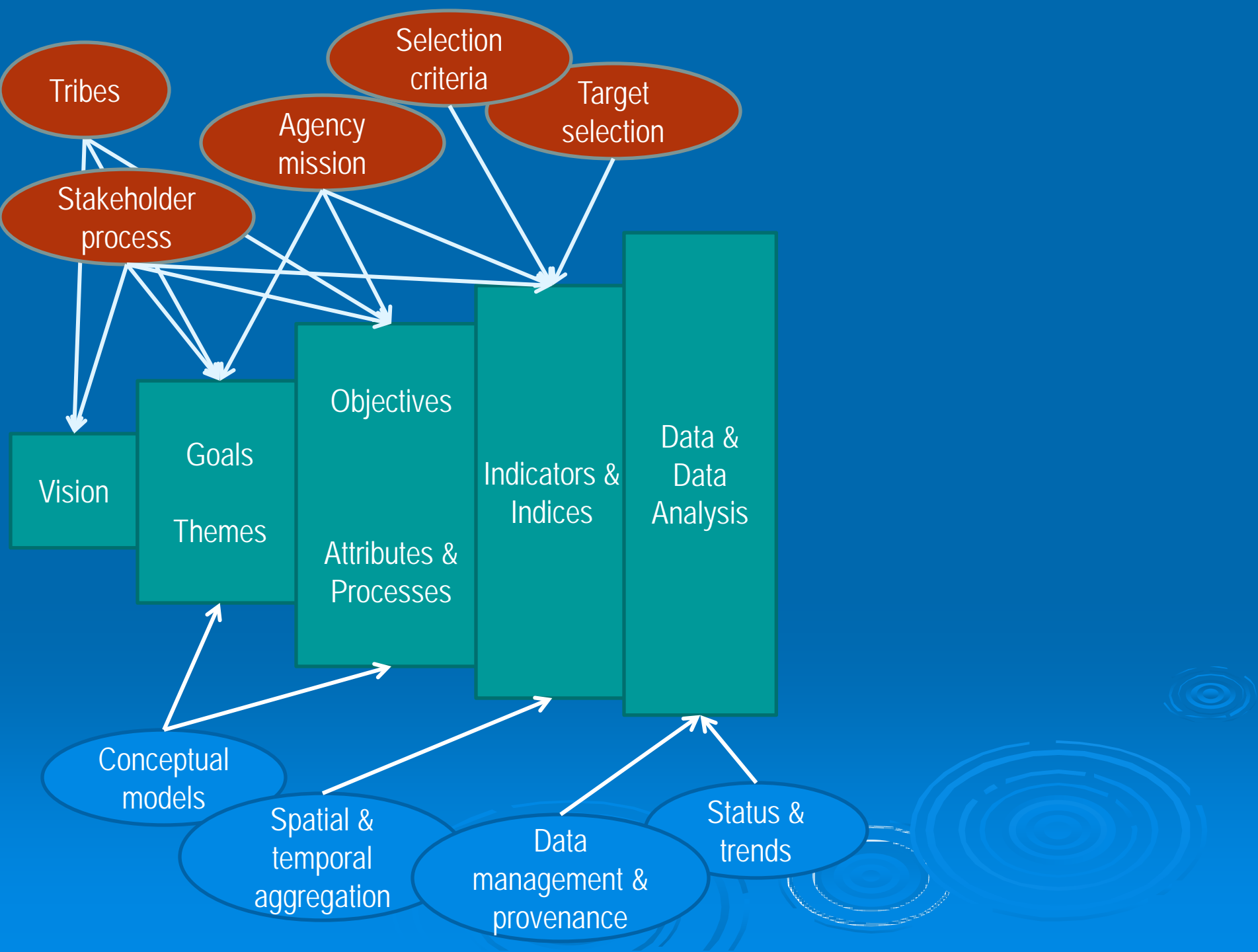
<b>Sustainability Objective</b>	<b>Related CWP Objective and RMS</b>	<b>Example Indicators</b>	<b>Relevance to Sustainability Objective</b>
1. Improve water use efficiency, increase water recycling, and increase water conservation in order to improve water supply reliability, reduce energy demand, and restore and maintain aquatic ecosystems and processes.	CWP Objective 2, 9; RMS Reduce demand	Energy required per unit of clean drinking water	Reduce energy demand for providing water
		Average water use per household,/capita, 20% reduction by 2020	Increase water conservation
		Sufficient flows and timing of flows for maintaining historically-present native aquatic fauna	Restore and maintain native ecosystems

Sustainability Objective	Related CWP Objective and RMS	Example Indicators	Relevance to Sustainability Objective
4. Protect and restore surface water and groundwater quality and the natural systems that maintain these services in order to safeguard human and environmental health and secure California water supplies.	CWP Objective 4; RMS on water quality; chapter 4 discussion of water quality sustainability indicators	Ratio of observed to expected native aquatic species	Protect and restore water quality for environmental health
		Surface-water Water Quality Index	Surface water quality to safeguard human and environmental health
		Groundwater Water Quality Index	Ground water quality to safeguard human health

# Topics for Discussion

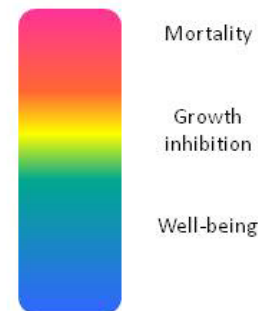
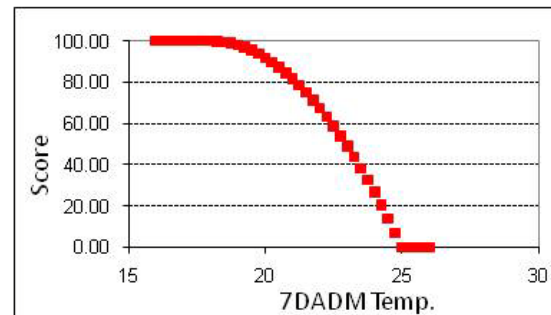
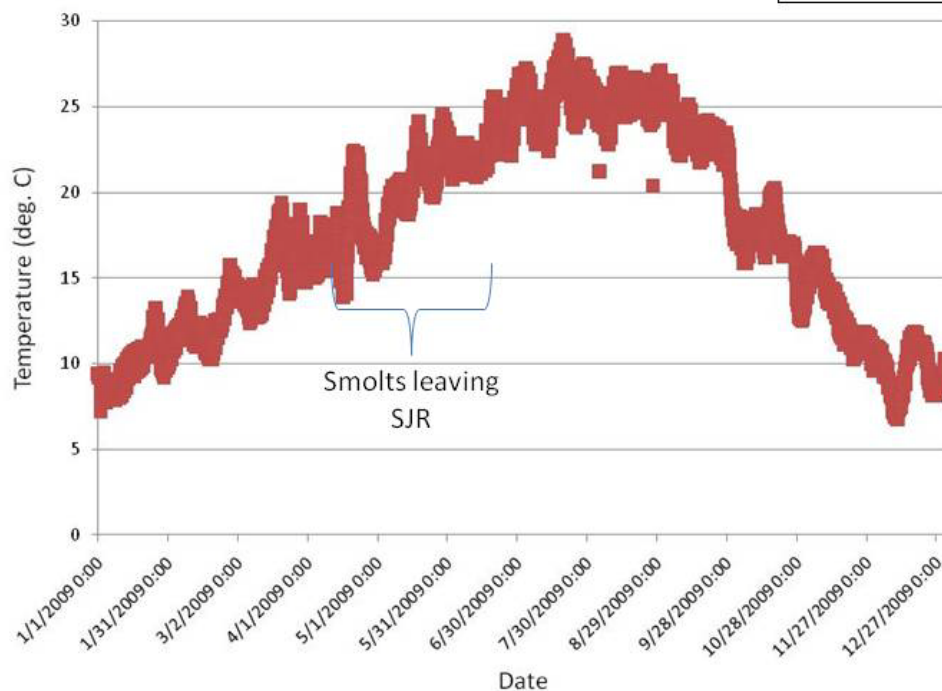
## ➤ Selecting Indicators

- Looking at the proposed selection criteria (page 7), what, if any, additional criteria should we consider for selecting indicators?
- What, if any, particular aspects of the social and economic systems should we consider as being important for the indicators development?
- Looking at the list of the objectives and indicators (Table 1 – page 5 and Table 2 – pages 7/8), what, if any, indicators should be added or removed?

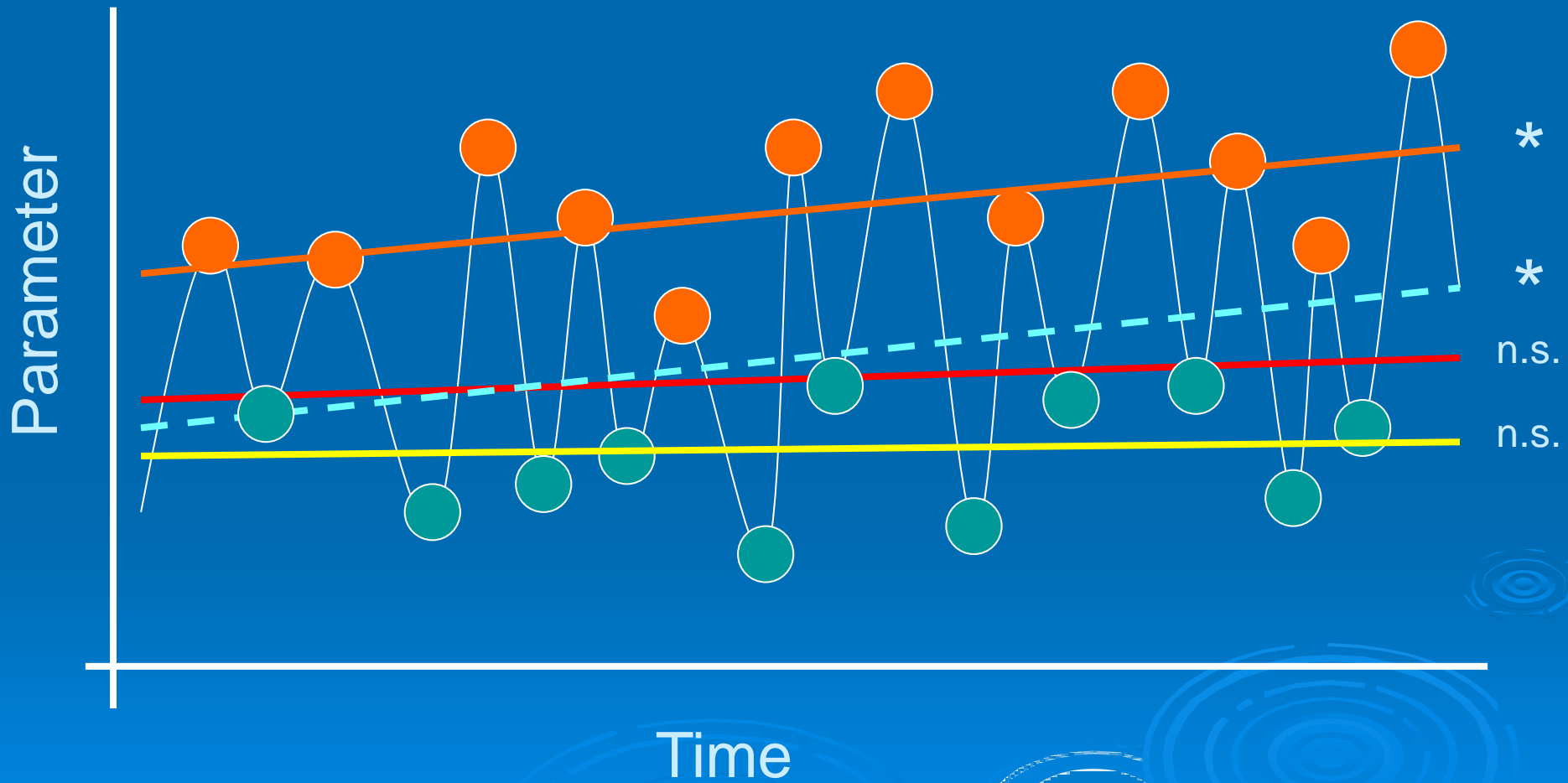


# How do we measure condition?

Salmon egg – juvenile well-being and water temperature (San Joaquin River)

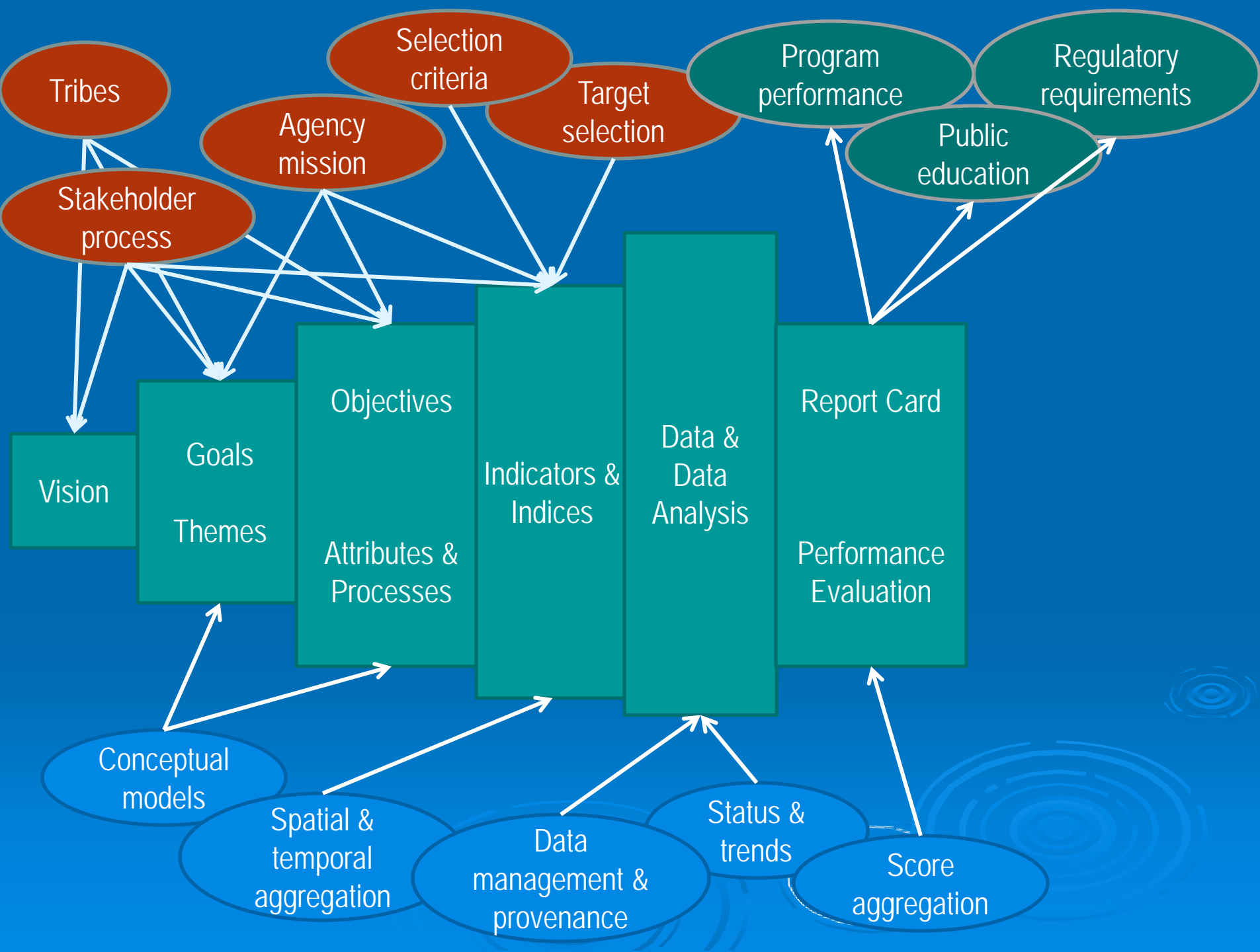


Trends analysis using non-parametric tests to control for environmental or other periodicity. Trends in what?



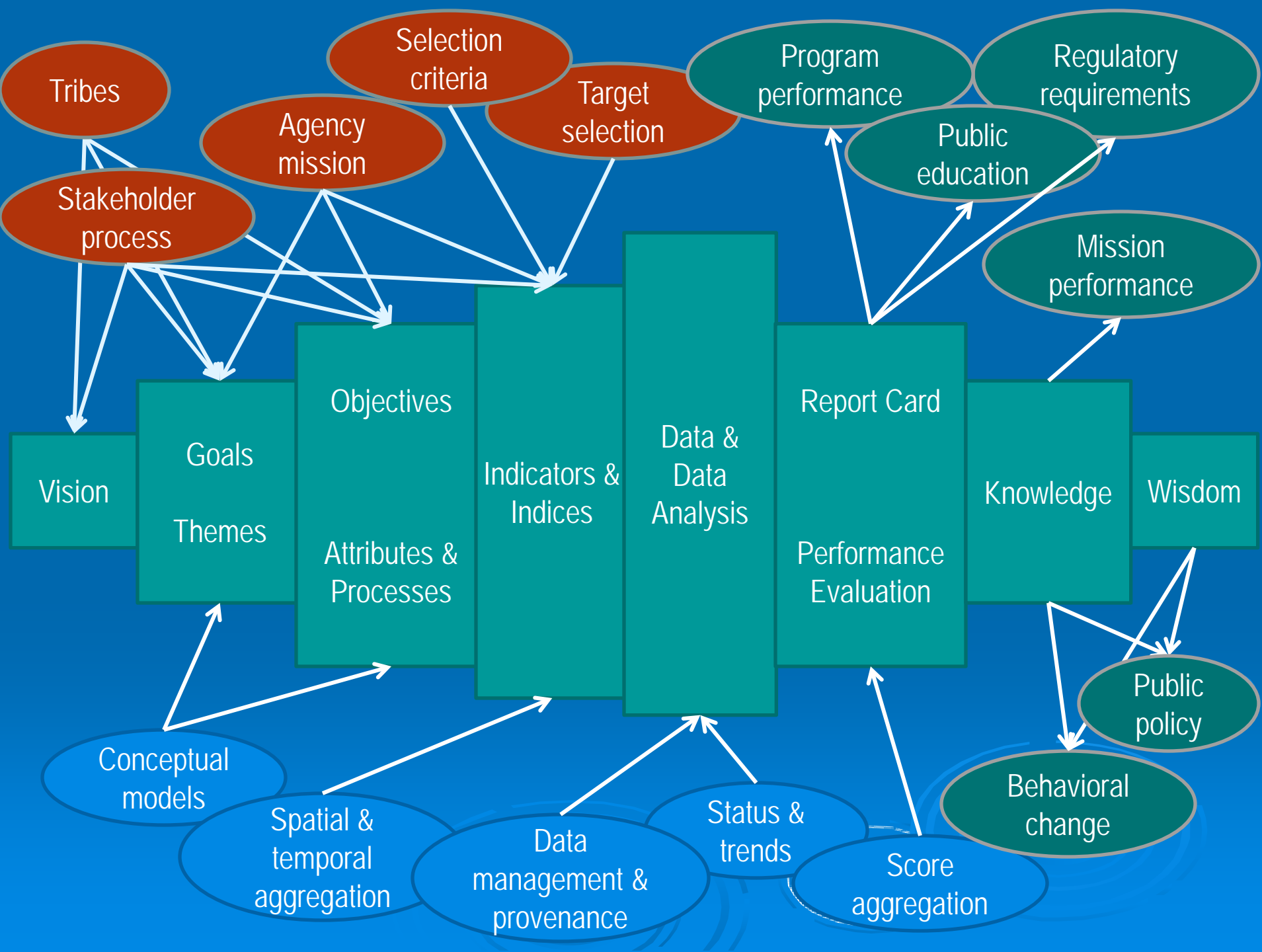
# Trends and Confidence

- Seasonal Kendall trends analysis
  - Seasonal correction
  - Trend quantification
- Confidence and certainty
  - Quantitative and qualitative





Goals	Measurable Objective	Condition	Trend	Confidence
Water quality and supply for natural and human communities	Water quality for aquatic health	50	↔	Medium-high
	Maintain natural stream flows	55	n/a	Medium
Protect and restore native animals and plants	Native birds	100	↔	Medium
	Native invertebrates	46	↔	High
	Native fish	49	↔	High
	Agricultural/urban development	90	n/a	Medium
Protect and enhance habitats, ecosystems, and watersheds	Protect aquatic connections	77	n/a	Medium-high
	Protect landscape connections	33	n/a	High
	Maintain natural production and nutrient cycles	82	↓	Medium
Maintain and restore natural disturbance	Restore natural fire regimes	9	↔	Medium
	Encourage natural flooding, while protecting people	50	n/a	Low
Improve social and economic conditions & benefits from healthy watersheds	Enhance wildlife-friendly agriculture	83	↑	Medium-high
	Improve community economic status	51	↓	High



# Show connections between condition and changes needed to be sustainable

Sustainability Objective	Example Indicators	Value	Influences	Management Responses
4. Protect and restore surface water and groundwater quality and the natural systems that maintain these services in order to safeguard human and environmental health and secure California water supplies.	Ratio of observed to expected native aquatic species	47	Invasive weeds, water temperature, migration barriers, inadequate flows	Weed abatement, increased summer flows, fish ladders or barrier removal
	Surface-water Water Quality Index	63	Discharge to waterways, inadequate summer flows, invasive weeds, water withdrawals/transfers, climate change	Improved discharge treatment, weed abatement, incentives for regional water supply and against inter-basin
	Groundwater Water Quality Index	82	Agricultural chemicals, irrigation and drinking water withdrawals, inadequate septic, impermeable surface development	Best management practices for agriculture, conjunctive water management, wastewater treatment, improve regional development and redevelopment standards



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## CA Water Sustainability Indicators

Where are we going next?

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## CA Water Sustainability Indicators

### Project Schedule

#### Phase 1 (Analytical Framework)

- ☐ Workshop 1: Draft Framework review Fall/2011
- ☐ CA Water Sustainability Indicators Framework On-going

#### Phase 2 (Quantitative Analysis & Gap Analysis)

- ☐ Scoping for quantitative analysis Fall/2011
- ☐ Additional Workshops Late 2011 - 2012
- ☐ Draft documentation and deliverables Spring/2013
- ☐ Final documentation and deliverables Fall/2013

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## CA Water Sustainability Indicators

### Near Term Outreach Efforts:

1. Tribal perspective from Tribal AC: August/2011
2. Feedback from Today's workshop: August/2011
3. Technical review at SWAN workshop: October/2011
4. Present Framework to SWRR  
Fall Meeting in Sacramento, CA: Dec 6 & 7/2011
5. Regional coordination - regional forums: Late 2011

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## CA Water Sustainability Indicators

### Contact Information

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